Computers in Biology and Medicine

VOLUME 26 1996

LIST OF CONTENTS AND AUTHOR INDEX

PERGAMON

Computers in Biology and Medicine

An International Journal

Editor-in-Chief: ROBERT S. LEDLEY
National Biomedical Research Foundation, Georgetown University Medical Center, 3900 Reservoir Road, N.W., Washington, DC 20007, U.S.A.

Managing Editor: BLAIRE V. MOSSMAN
P.O. Box 13177, Scottsdale, AZ 85267-3177, U.S.A.

European Deputy Editor: FRANCESCO PINCIROLI
Dipartimento di Bioingegneria, Politecnico di Milano, Piazza Leonardo da Vinci, 32, 20133 Milano, Italy

Associate Editors

E. NEELY ATKINSON, U.S.A.
WILLIAM R. AYERS, U.S.A.
COLIN B. BEGG, U.S.A.
MICHAEL BUAS, U.S.A.
C. A. CACERES, U.S.A.
ALDEN W. DUDLEY JR, U.S.A.
ROBERT M. ELASHOFF, U.S.A.
MARIO FERRARO, Italy
PAUL D. FISHER, Canada
DAVID H. FOSTER, U.K.
H. L. L. FRANK, The Netherlands
ROBERT S. GALEN, U.S.A.
DAVID G. GEORGE, U.S.A.
STEPHEN L. GEORGE, U.S.A.
EDMUND M. GLASER, U.S.A.
F. P. GLICK, Canada
H. C. HEMKER, The Netherlands
GEORGE HRIPCSAK, U.S.A.
H. K. HUANG, U.S.A.
ROGER JELLIFFE, U.S.A.
INGER KJAER, Denmark
CASIMIR A. KULIKOWSKI, U.S.A.
CHAN F. LAM, U.S.A.
FRED D. LEDLEY, U.S.A.
GARY S. LEDLEY, U.S.A.
STEVEN L. LEHMAN, U.S.A.
JAMES M. LESTER, U.S.A.
CLIFF LIEBERMAN, U.S.A.
ZHI-QIANG LIU, Australia
HERBERT A. LUBS, Norway
JOCHEN R. MOEHR, Canada
RICHARD MOORE, U.S.A.
KENNETH L. MOSSMAN, U.S.A.
DAVID A. NAGEY, U.S.A.
ANDERS NATTESTAD, Denmark
BRUCE ORCUTT, U.S.A.
MONIQUE L. PAVEL, France
YUN PENG, U.S.A.
DENIS J. PROTTI, Canada
JAMES A. REGGIA, U.S.A.
R. P. CHANNING RODGERS, U.S.A.
J. ROSING, The Netherlands
FRANK H. RUDDLE, U.S.A.
PETER SANTAGO, U.S.A.
EUGENE S. SCHNELLER, U.S.A.
JOHN L. SEMMLOW, U.S.A.
WESLEY E. SNYDER, U.S.A.
BENI SOLOW, Denmark
THOMAS O. STAIR, U.S.A.
LAWRENCE STARK, U.S.A.
SUSAN L. TUCKER, U.S.A.
STANLEY TUHRIM, U.S.A.
SHIRO USUI, Japan
RUSSELL E. WALKER, U.S.A.
RICHARD F. WALTERS, U.S.A.
RICHARD L. WEBBER, U.S.A.
PAMELA H. WOLF, U.S.A.
STUART ZIMMERMAN, U.S.A.
A. E. ZUCKERMAN, U.S.A.

Production Editor: STEVE RAYWOOD
Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K.

Published 6 issues/annum in January, March, May, July, September and November

Publishing and Advertising Offices—*American Continent:* Elsevier Science Inc., 655 Avenue of the Americas, NY 10010, U.S.A.
Rest of the World: Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. Tel: (01865) 843000; Fax: (01865) 843010.

Annual Institutional Subscription Rates 1997: Europe, The CIS and Japan 1316 Dutch Guilders. All other countries US$812. Associated Personal Subscription rates are available on request for those whose institutions are library subscribers. Dutch Guilder prices exclude VAT. Non-VAT registered customers in the European Community will be charged the appropriate VAT in addition to the price listed. Prices include postage and insurance and are subject to change without notice. For orders, claims, product enquiries (no manuscript enquiries) please contact the Customer Support Department at the Regional Sales Office nearest to you: **The Americas**: Elsevier Science Customer Support Department, P.O. Box 945, New York, NY 10010, U.S.A. [Tel: (+1) 212-633-3730/1-888 4ES-INFO. Fax: (+1) 212-633-3680. E-mail: usinfo-f@elsevier.com]. **Japan**: Elsevier Science Customer Support Department, 9-15 Higashi-Azabu 1-chome, Minato-ku, Tokyo 106, Japan [Tel: (+3) 5561-5033. Fax: (+3) 5561-5047. E-mail: kyf04035@niftyserve.or.jp]. **Asia Pacific (*excluding Japan*)**: Elsevier Science (Singapore) Pte Ltd, No. 1 Temasek Avenue, 17-01 Millenia Tower, Singapore 039192 [Tel: (+65) 434-3727. Fax: (+65) 337-2230. E-mail: asiainfo@elsevier.com.sg]. **Rest of the World**: Elsevier Science Customer Service Department, P.O. Box 211, 1001 AE Amsterdam, The Netherlands [Tel: (+31) 20-485-3757. Fax: (+31) 20-485-3432. E-mail: nlinfo-f@elsevier.nl].

Periodicals postage paid at Newark, NJ and additional entry points. *Computers in Biology and Medicine* (ISSN 0010–4825) is published in January, March, May, July, September and November in one volume, by Elsevier Science Ltd, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, U.K. The annual subscription in the U.S.A. is US$812. *Computers in Biology and Medicine* is distributed by Mercury Airfreight International Ltd, 10 Camptown Road, Irvington, NJ 07111-1105. Postmaster: please send address corrections to *Computers in Biology and Medicine*, c/o Elsevier Science RSO, Customer Support Department, 655 Avenue of the Americas, New York, NY 10010, U.S.A. [Tel.: (+1) 212-633-3730/1 888 4ES-INFO. Fax: (+1) 212-633-3680. E-mail: usinfo-f@elsevier.com].

Cooperating Societies—American Institute of Nutrition; American Society of Biological Chemists; American Society for Pharmacology and Experimental Therapeutics Inc.; Association for Computing Machinery: Biophysical Society; Pattern Recognition Society; Federation of European Biochemical Societies; The Danish Biochemical Society; Societa Italiana di Biochimica; Nederllands Vereniging Voor Biochemie; Sveriges Biokemiska Forening.

Listing as a cooperating society does not imply endorsement or sponsorship of *Computers in Biology and Medicine* by individual societies.

Copyright © 1996 Elsevier Science Ltd. All rights reserved

CONTENTS OF VOLUME 25

Number 1

G. C. Sharma, M. Jain and R. N. Saral 1 A mathematical model for concentration of blood affecting erythrocyte sedimentation

V. N. Reddy, M. N. Liebman and M. L. Mavrovouniotis 9 Qualitative analysis of biochemical reaction systems

B. Sankur, E. Çağatay Güler and Y. P. Kahya 25 Multiresolution biological transient extraction applied to respiratory crackles

J. A. Byers 41 Random selection algorithms for spatial and temporal sampling

J. Miao, P. J. Benkeser and F. T. Nichols 53 A computer-based statistical pattern recognition for Doppler spectral waveforms of intracranial blood flow

Z.-Q. Liu, T. Austin, C. D. L. Thomas and J. G. Clement 65 Bone feature analysis using image processing techniques

M. Ikeda, T. Ishigaki and K. Yamauchi 77 Estimation of the size of the media necessary to construct a medical image database

A. Eblen-Zajjur, R. Salas and H. Vanegas 87 Fractal analysis of spinal dorsal horn neuron discharges by means of sequential fractal dimension *D*

Number 2

L. M. Sztandera, L. S. Goodenday and K. J. Cios 97 A neuro-fuzzy algorithm for diagnosis of coronary artery stenosis

J. J. Vaquero, H. Rahms, M. V. Green and F. del Pozo 113 Dynamic circular buffering: a technique for equilibrium gated blood pool imaging

O. Barnea, S. Abboud, A. Guber and I. Bruderman 123 New model-based indices for maximum expiratory flow–volume curve in patients with chronic obstructive pulmonary disease

J. A. Reggia and D. Montgomery 133 A computational model of visual hallucinations in migraine

T. L. Rusch, R. Sankar and J. E. Scharf 143 Signal processing methods for pulse oximetry

F. R. Zypman 161 MRI electromagnetic field penetration in cylindrical objects

177 Call for Participation

Number 3

Special Issue: Information Retrieval and Genomics

J. N. Guidi and E. A. Fox 179 Information Retrieval and Genomics—an introduction

M. Graves, E. R. Bergeman and C. B. Lawrence 183 A graph conceptual model for developing human genome center databases

S. Ganguly and M. Noordewier 199 PROXIMAL: a database system for the efficient retrieval of genetic information

W. J. Wilbur and Y. Yang 209 An analysis of statistical term strength and its use in the indexing and retrieval of molecular biology texts

K. W. Goodman 223 Ethics, genomics, and information retrieval

General Papers

E. Tziampazis and A. Sambanis 231 Engineering a normally responsive bioartificial pancreas based on glucose-hypersensitive cells

X. Zhou, J. Bai and F. Yiang 241 The effects of intra-aortic balloon pumping combined with coronary sinus interventions on failing hearts: a model study

R. H. Stern and H. Rasmussen 255 Left ventricular ejection: model solution by collocation, an approximate analytical method

T. Fagan 263 Quickbasic program for exact and mid-P confidence intervals for a binomial proportion

S. H. Ong, X. C. Jin, Jayasooriah and R. Sinniah 269 Image analysis of tissue sections

Number 4

J. Redling and M. Akay 281 Evaluation of the tracking potential of a noninvasive estimator of cardiac output

M. Ursino, A. Fiorenzi and E. Belardinelli 297 The role of pressure pulsatility in the carotid baroreflex control: a computer simulation study

P. Bhattacharya and D. Wild 315 A new edge detector for gray volumetric data

D. Gibson and P. A. Gaydecki 329 The application of local grey level histograms to organelle classification in histological images

M. Batouche, R. Benlamri and M. K. Kholladi 339 A computer vision system for diagnosing scoliosis using moiré images

J. P. Cambus, F. Nguyen and F. Cambus 355 A data management software for the Sysmex NE 8000 haematology analyser

Book Review 361

Number 5

R. R. Burnette 363 Computer simulation of human blood flow and vascular resistance

J. K.-J. Li, J.-J. Wang and G. Drzewiecki 371 Computer modeling of non-adjacent regional ischemic zones on ventricular function

K. Mueller, E. L. LaPresto, K. A. Powell, J. L. Hirsch and J. F. Cornhill 385 A medical workstation for the display and analysis of multi-frame digital cineradiographic data

M. Bayram 401 Automatic analysis of the control of metabolic networks

D. M. Dilts and M. J. Doughty 409 A program for analyzing the morphological organization of tessellated cellular mosaics

N. Pradhan and P. K. Sadasivan 419 The nature of dominant Lyapunov exponent and attractor dimension curves of EEG in sleep

T. M. Masterson and J. K. Kelleher 429 Monte Carlo spreadsheet modeling of stable isotope biosynthesis

I. Dvorchik, W. Marsh, V. Gurari, M. Subotin and H. R. Doyle 439 Multisolutional clustering and quantization algorithm (MCQ)

Number 6

N. Baykal, J. A. Reggia, N. Yalabik, A. Erkmen and M. S. Beksac 451 Feature discovery and classification of Doppler umbilical artery blood flow velocity waveforms

T. B. Givens, P. Braun and T. J. Fischer 463 Predicting the presence of plasma heparin using neural networks to analyze coagulation screening assay optical profiles

B. N. Prasad, S. M. Finkelstein and M. I. Hertz 477 An expert system for diagnosis and therapy in lung transplantation

B. A. Todd and H. Wang 489 A VISUAL BASIC program to pre-process MRI data for finite element modeling

A. Ray, M. Maiti and A. Nandy 497 SCATPLOT: a computer program for determination of binding parameters of non-linear non-cooperative ligand–substrate interactions

E. I. Ette 505 Comparing non-hierarchical models: application to non-linear mixed effects modeling

P.-Y. Boëlle, P. Garnerin and A.-J. Valleron 513 A sequential procedure to test the progressive decrease of rare adverse events

I Title Page, Volume Contents and Author Index